"GRIDS"

Ground-based
Remote Icing Detection System

Timothy Schneider

NOAA-ETL

Acknowledgements:

- The GRIDS team, past, present & future
  - Carroll Campbell, technical lead.
- FAA AWRP Sponsorship
- NOAA-OAR subsidized

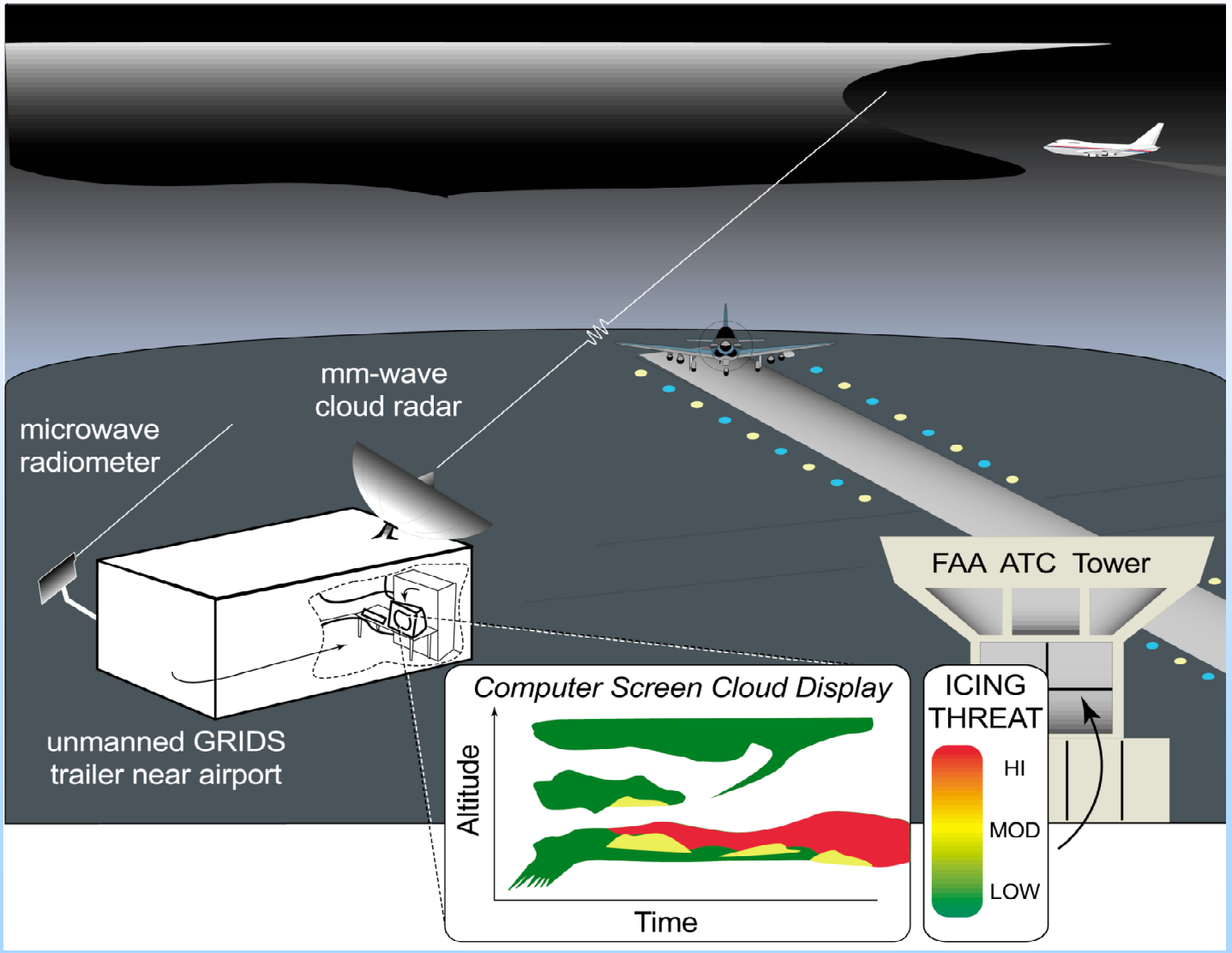
The NCAR Connection:

- Presently: IFI-PDT, Marcia Politovich
- 01Oct04: AWRT-PDT, Kim Elmore

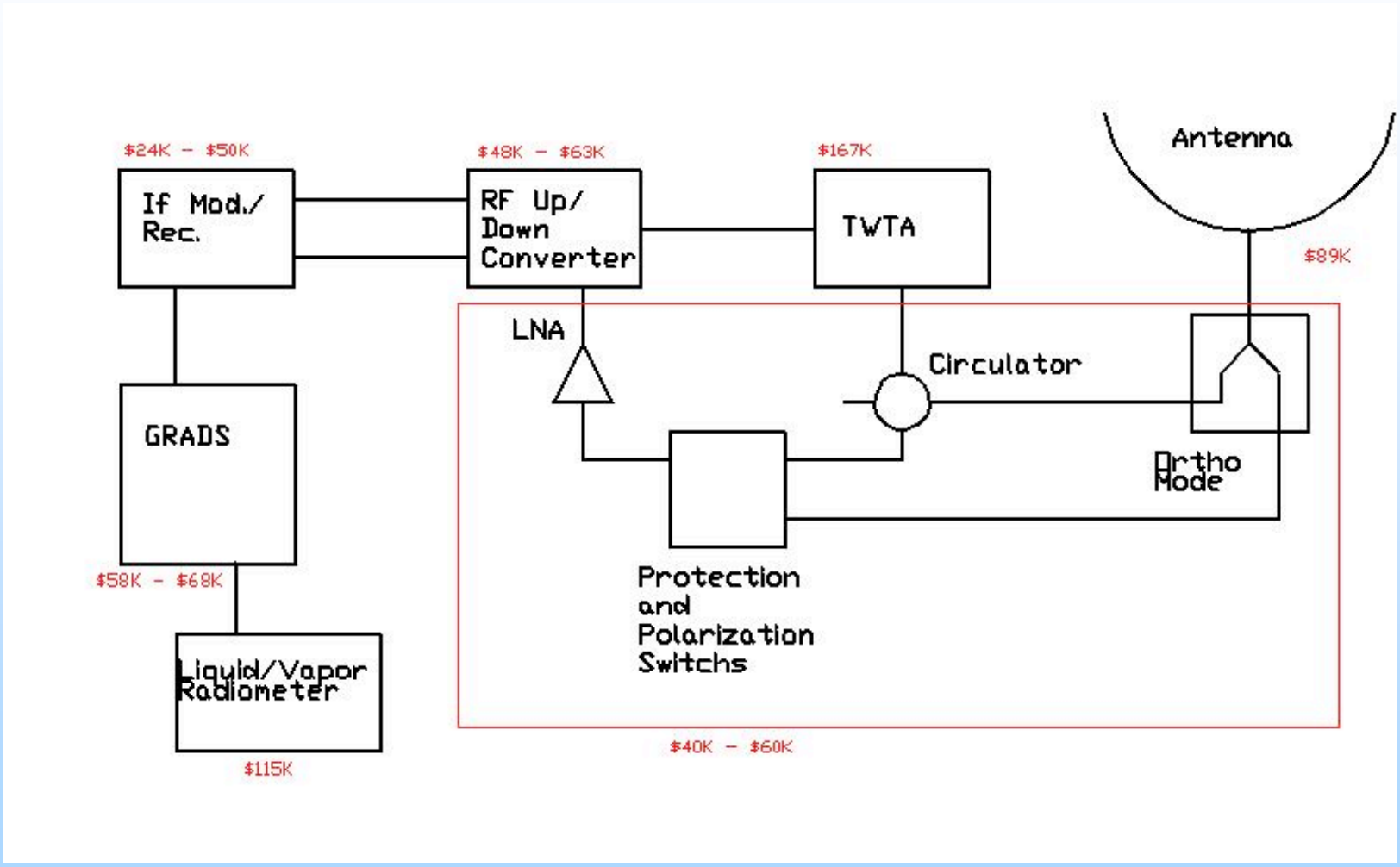
A Grab-Bag of Issues

- Move to AWRT
  - Other Applications
- NOAA-NWS funding
- Boulder labs consolidation
- AIRA Membership for NOAA
- Algorithm issues
- Spectra
- Temperature information
- All weather (RAIN!) operations
- AIRS2 & WISP04: Data processing; case studies
- Future plans…

The GRIDS Design



Schematically speaking…

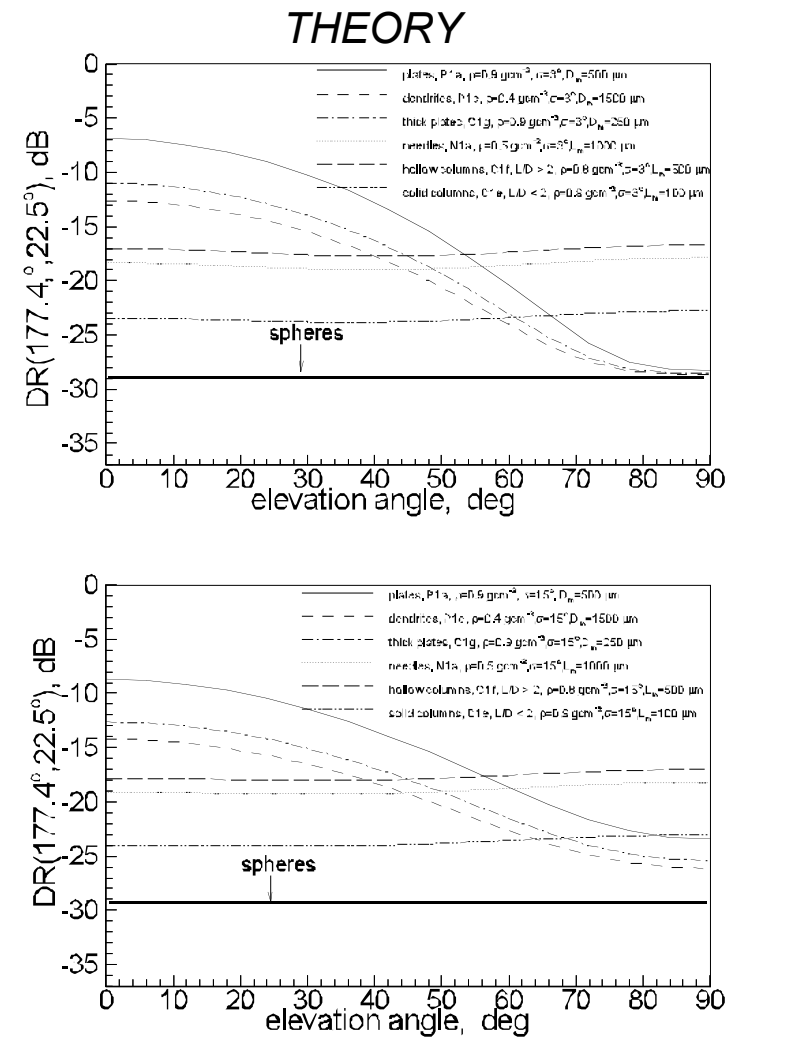


Based on proven technologies…

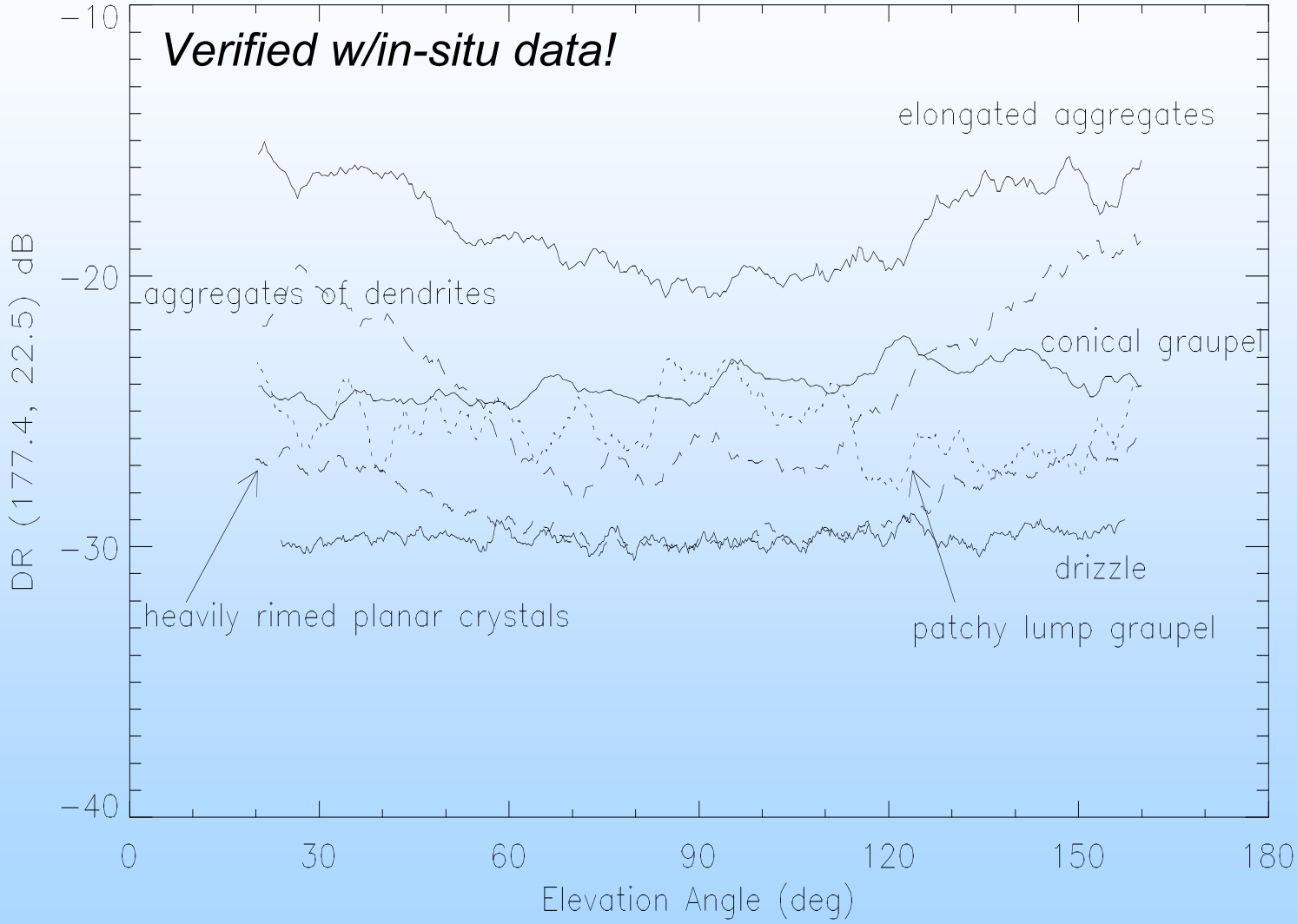
Discriminating Ice & Liquid: DR

Slant-45 Quasi-Linear Polarization

- Minimum crystal flutter sensitivity.
- Very good separation by shape.
- Drizzle vs. Ice differ though wide elevation arc.
- Deterministic drizzle I.D. above cross-talk.
- Sensitive to lower reflectivity clouds.



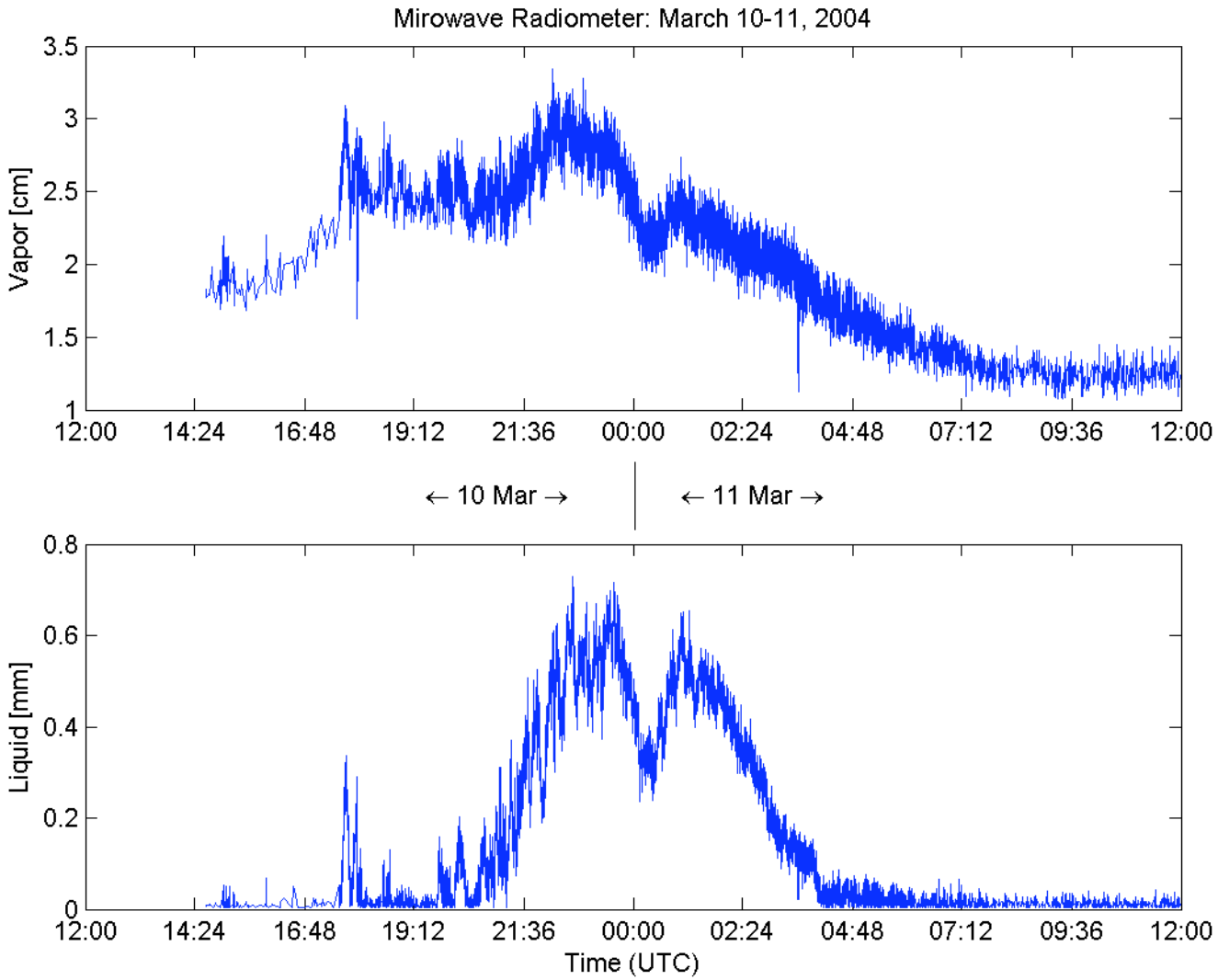
DR Measurements of Irregular Ice Crystals and Supercooled Drizzle



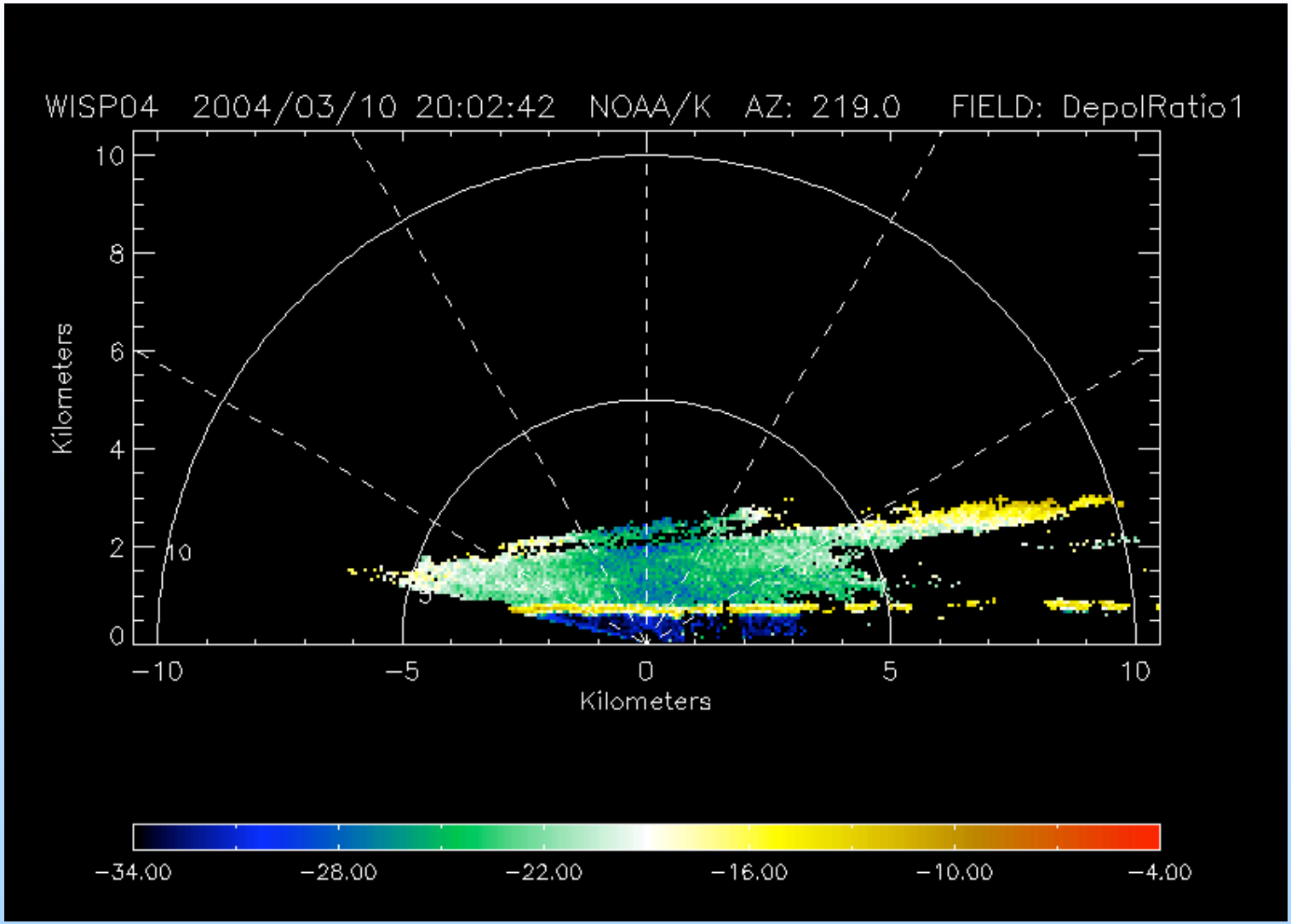
Implementation Plan

- **Design "Target" GRIDS: Completed Sept. '01**
  - Full sensitivity
  - Unattended 24/7/365 operations
  - Real-time graphical output (2 min update)
  - Auto calibration and health
  - Zenith option (spectra!)
- **Build "Upgradable" GRIDS: Ongoing**
  - Fast-track effort
  - Use target blueprint
  - "Borrow" components; less sensitive; not autonomous
  - Participated in AIRS2 (Nov-Dec '03); WISP04 (Feb-Apr, '04)
- **Evolve to "Target" GRIDS: FY06 - FY07**
  - Timeline is partner-dependent (FAA; NWS)
  - Ends with extended demo/assessment @ icing-prone airport

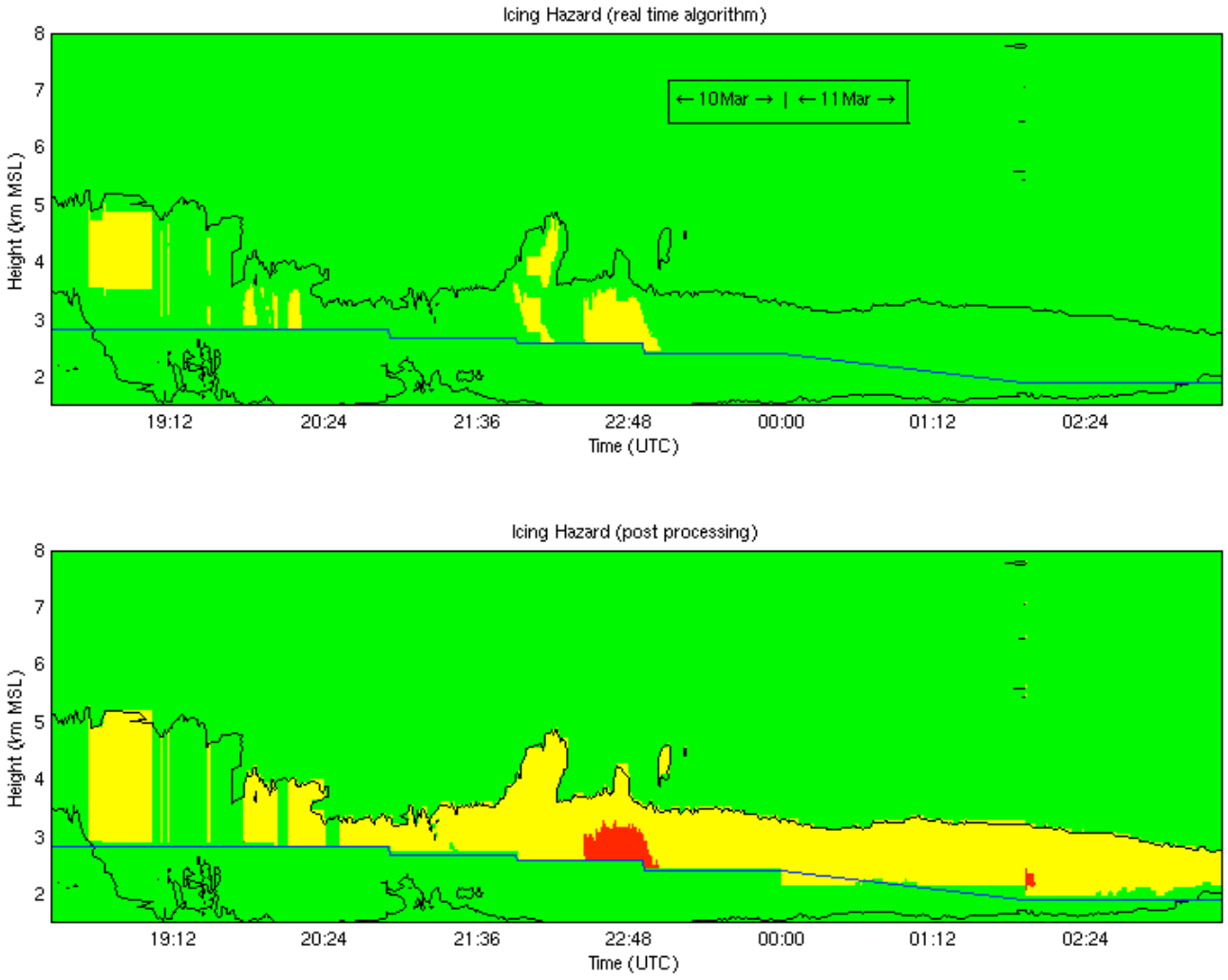
A WISP04 Case Study: Radiometer



A WISP04 Case Study: Radar (DR)



A WISP04 Case Study: Icing Alg.

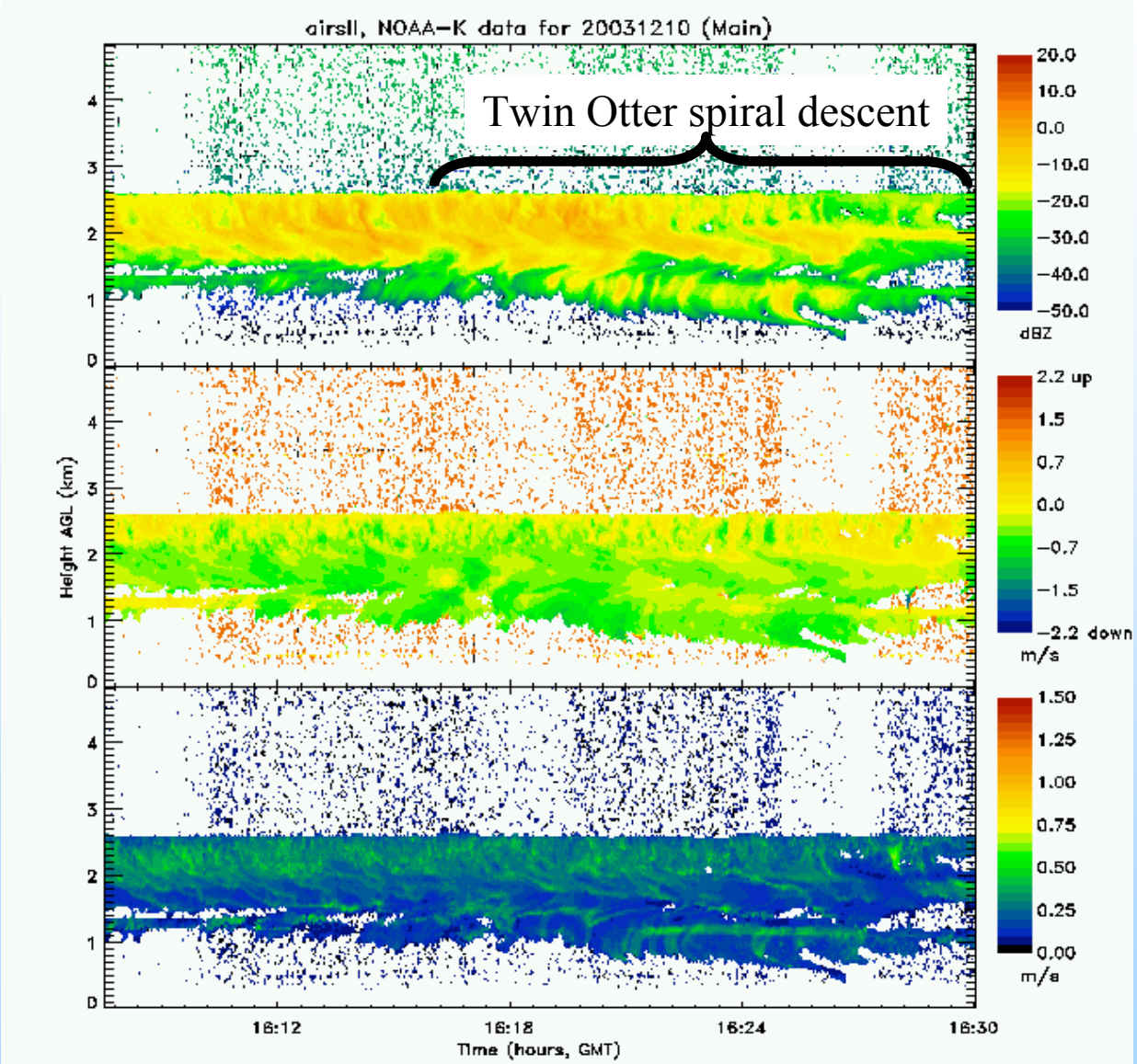


An AIRS2 Case Study

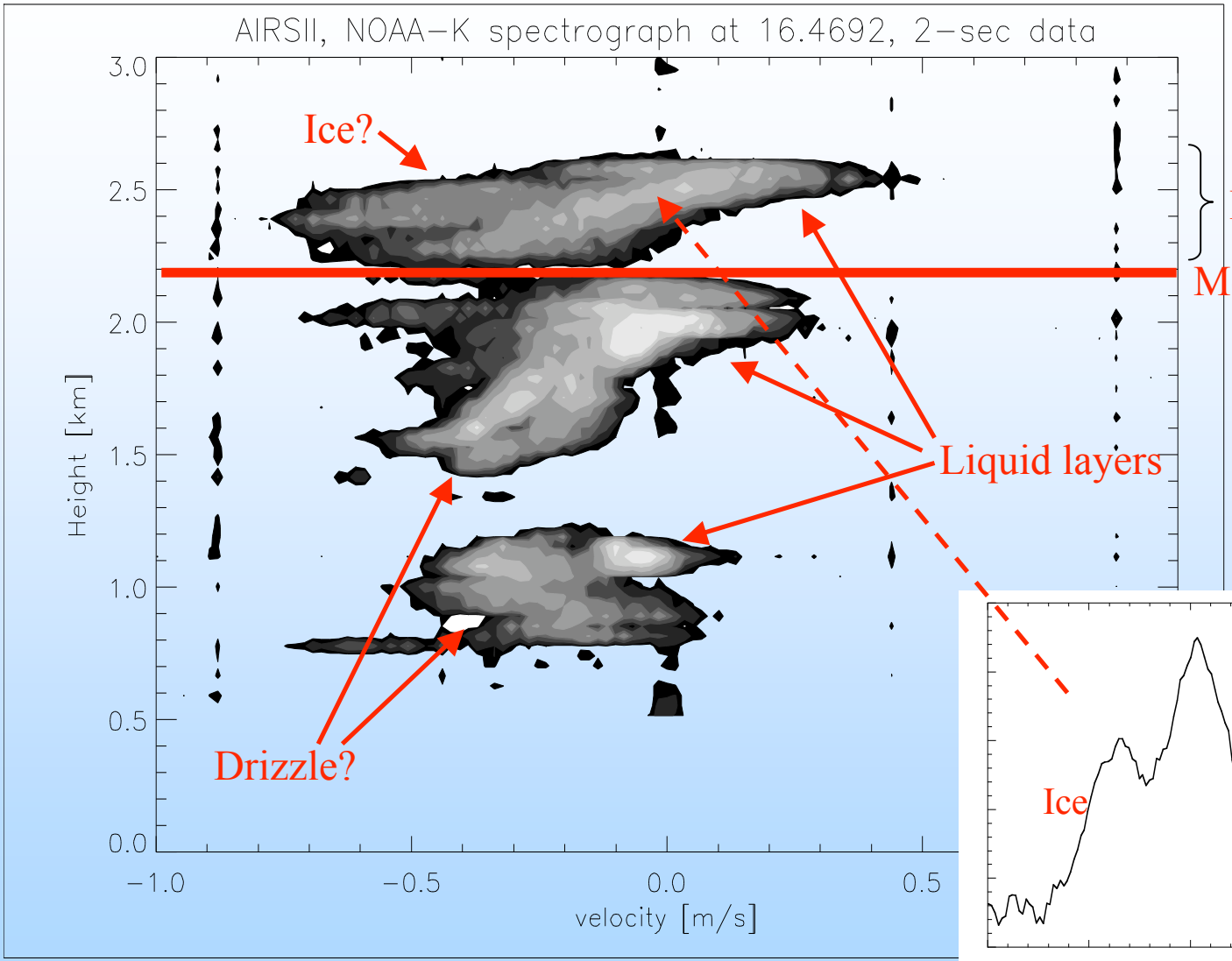
Twin Otter:
Icing near cloud top
LWC ~0.5g/m^3

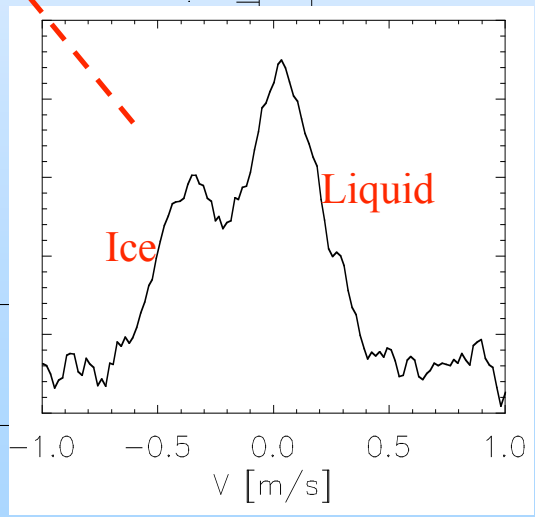
NASA radiometer:
LWP ~210-280 g/m^2

17:00 Z sounding:
T<0 C above 2.2 km



AIRS2 Case Study: Vertical Spectra



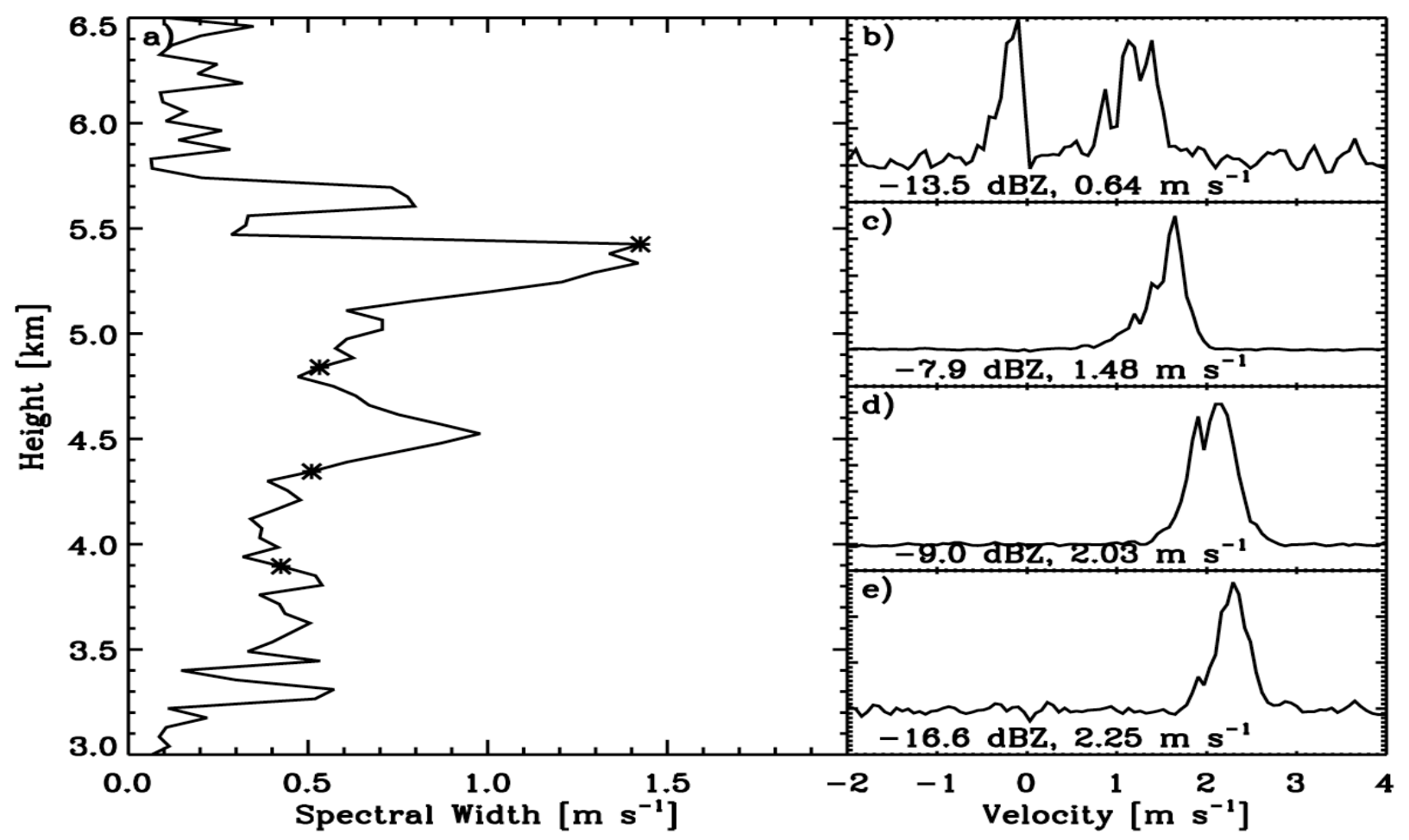


New Developments & Upgrades
Part I

- RADS [GRADS
  i. GRADS software is built from existing RADS software, which has been in use for eight years in ground-based scanning and airborne systems;
  ii. offers high-resolution real-time displays of up to 32 meteorological parameters;
  iii. modular software design allows for easy addition of new capabilities;

- ["DIGI-GRADS"
  i. new Linux-based PC system is low cost;
  ii. digital receiver enhances dynamic range;
  iii. signal processing done on host Pentium (no DSP board required) is portable and scalable;
  iv. permits us to upgrade to spectral processing

New Developments & Upgrades
Part II



New Developments & Upgrades
Part III